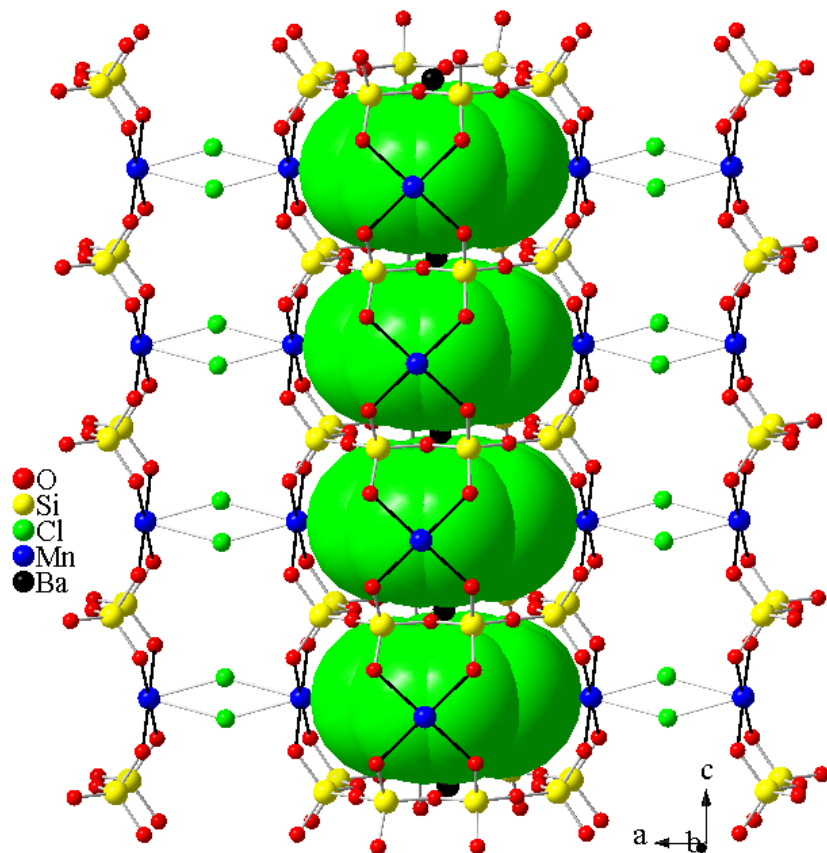


# Salt-Inclusion Synthesis of Nano-structured Transition Metal Silicates and Phosphates

Shiou-Jyh Hwu, Clemson University, DMR-0077321

The salt-inclusion synthesis of microporous materials is a novel technique first recognized in our laboratory. Novel open framework structures can be synthesized at high temperatures (500-1000 °C) in molten salt media. These high temperatures were once thought to not allow open framework structures to be synthesized, however, the salt-template allows for structures to be isolated with salt inclusion into the micropores. These high-temperature frameworks form an interesting class of compounds of catalytic, electronic and magnetic importance. They can be used for comparative studies with those synthesized via typical low-temperature (~100-200 °C) hydrothermal synthesis techniques using organic templating agents to acquire a fundamental understanding of the structure and bonding of solids prepared at extreme conditions.



Partial structure of  $(\text{BaCl}_2) \cdot (\text{Ba}_9\text{Cl}_{10})\text{Mn}_4(\text{SiO}_3)_8$  showing nano-structured 8-ring Mn-O-Si channel templated by a single column of CsCl-type  $\text{BaCl}_2$  salt lattice. The 16-ring, not shown, is filled with  $\text{Ba}_9\text{Cl}_{10}$ .

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## Education:

Two undergraduates (Erin Ferguson and Beth Alderman) and eight graduate students (G. Becht, X. Mo, S. Ranmohatti, Y. Sun, S. Taylor, L. Wang, M. Williams, M. Zarzyczny) are pursuing research in the solid state materials chemistry lab. Undergraduate Erin Ferguson won the College of Engineering and Science's Outstanding Junior in Science Award. Graduate student Xunhua Mo received College's Outstanding Graduate Teaching award. Dr. Alain Lafond, an exchange researcher from Institut des Matériaux Jean Rouxel in Nante, France, visited the lab during the past summer through our *International Collaboration and Student Exchange Program (ICASEP)*.

## Outreach:

With undergraduate students Erin Ferguson (who was a high school researcher in PI's lab in 1999) and Beth Alderman, the PI promoted solid state materials chemistry at a couple of local high schools. This includes giving lectures and chemistry demonstrations on the topic of Smart Materials.



Through *ICASEP*, Erin studied at Ecole Polytechnique de l'Université de Nantes, France with Donald Schleich on *Coated Nanoparticles for Use as a Novel Anode Materials*.